

WHAT IS CLAIMED IS:

1. A stable liquid biuret modified toluene diisocyanate comprising a secondary amine based biuret modified toluene diisocyanate having an NCO group content of 16 to 46% by weight, comprising:
  - 5 (a) a secondary monoamine group containing compound which may be aliphatic, aromatic or araliphatic; and
  - (b) toluene diisocyanate having an NCO group content of about 48.3% and comprising:
    - 10 (i) from 0 to 40% by weight of 2,6-toluene diisocyanate, and
    - (ii) from 60 to 100% by weight of 2,4-toluene diisocyanate, wherein the %'s by weight of (b)(i) and (b)(ii) total 100% by weight of (b).
2. The stable liquid modified toluene diisocyanate of Claim 1, wherein the NCO group content ranges from 20 to 40% by weight.
- 20 3. The stable liquid biuret modified toluene diisocyanate of Claim 1, wherein (a) said secondary monoamine group containing compound has a molecular weight of from about 45 to about 600.
4. The stable liquid biuret modified toluene diisocyanate of 25 Claim 1, wherein (a) said secondary monoamine group containing compound is selected from the group consisting of dipropylamine, dibutylamine, dipentylamine, dihexylamine and dioctylamine.
5. The stable liquid biuret modified toluene diisocyanate of 30 Claim 1, wherein (b) said toluene diisocyanate comprises:

(i) from about 20 to about 35% by weight of 2,6-toluene diisocyanate, and

(ii) from about 65 to about 80% by weight of 2,4-toluene diisocyanate, wherein the %'s by weight of (b)(i) and (b)(ii) total 100% by weight of (b).

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6. A process for the preparation of a stable liquid biuret modified toluene diisocyanate comprising a secondary amine based biuret modified toluene diisocyanate having an NCO group content of 16 to 46% by weight, comprising

10 (1) reacting

(a) a secondary monoamine group containing compound which may be aliphatic, aromatic or araliphatic;

with

(b) toluene diisocyanate having an NCO group content of about 15 48.3% and comprising:

(i) from 0 to 40% by weight of 2,6-toluene diisocyanate, and

(ii) from 60 to 100% by weight of 2,4-toluene diisocyanate,

20 wherein the %'s by weight of (b)(i) and (b)(ii) total 100% by weight of (b);

in the presence of

(d) at least one allophanate catalyst.

25 7. The process of Claim 6, wherein the NCO group content ranges from 20 to 40% by weight.

30 8. The process of Claim 6, wherein (a) said secondary monoamine group containing compound has a molecular weight of from about 45 to about 600.

9. The process of Claim 6, wherein (a) said secondary monoamine group containing compound is selected from the group consisting of dipropylamine, dibutylamine, dipentylamine, dihexylamine and dioctylamine.

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10. The process of Claim 6, wherein (b) said toluene diisocyanate comprises:

- (i) from about 20 to about 35% by weight of 2,6-toluene diisocyanate, and
- 10 (ii) from about 65 to about 80% by weight of 2,4-toluene diisocyanate, wherein the %'s by weight of (b)(i) and (b)(ii) total 100% by weight of (b).

11. A stable liquid biuret allophanate modified toluene diisocyanate having an NCO group content of 16 to 46% by weight, and

15 comprising:

- (a) a secondary monoamine group containing compound which may be aliphatic, aromatic or araliphatic;
- (b) toluene diisocyanate having an NCO group content of about 48.3% and comprising:
  - (i) from 0 to 40% by weight of 2,6-toluene diisocyanate, and
  - (ii) from 60 to 100% by weight of 2,4-toluene diisocyanate,

20 wherein the %'s by weight of (b)(i) and (b)(ii) total 100% by weight of (b);

25 and

- (c) an aliphatic or aromatic alcohol.

12. The stable liquid biuret allophanate modified toluene diisocyanate of Claim 11, wherein the NCO group content ranges from 20 to 40% by weight.

13. The stable liquid biuret allophanate modified toluene diisocyanate of Claim 11, wherein (a) said secondary monoamine group containing compound has a molecular weight of from about 45 to about 600.

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14. The stable liquid biuret allophanate modified toluene diisocyanate of Claim 11, wherein (b) said toluene diisocyanate comprises:

10 (i) from about 20 to about 35% by weight of 2,6-toluene diisocyanate, and

(ii) from about 65 to about 80% by weight of 2,4-toluene diisocyanate, wherein the %'s by weight of (b)(i) and (b)(ii) total 100% by weight of (b).

15 15. The stable liquid biuret allophanate modified toluene diisocyanate of Claim 11, wherein (c) said aliphatic alcohol has from 1 to 36 carbon atoms and said aromatic alcohol has from 5 to 20 carbon atoms.

20 16. A process for the preparation of a stable liquid biuret allophanate modified toluene diisocyanate having an NCO group content of 16 to 46% by weight, comprising:

(1) reacting

25 (a) a secondary monoamine group containing compound which may be aliphatic, aromatic or araliphatic;

(b) toluene diisocyanate having an NCO group content of about 48.3% and comprising:

(i) from 0 to 40% by weight of 2,6-toluene diisocyanate, and

(ii) from 60 to 100% by weight of 2,4-toluene diisocyanate,

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wherein the %'s by weight of (b)(i) and (b)(ii) total 100% by weight of (b);

and

(c) an aliphatic or aromatic alcohol;

5 in the presence of

(d) at least one allophanate catalyst.

17. The process of Claim 16, wherein the NCO group content ranges from 20 to 40% by weight.

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18. The process of Claim 16, wherein (a) said secondary monoamine group containing compound has a molecular weight of from about 45 to about 600.

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19. The process of Claim 16, wherein (b) said toluene diisocyanate comprises:

(i) from about 20 to about 35% by weight of 2,6-toluene diisocyanate, and

(ii) from about 65 to about 80% by weight of 2,4-toluene diisocyanate,

20 wherein the %'s by weight of (b)(i) and (b)(ii) total 100% by weight of (b).

20. The process of Claim 16, wherein (c) said aliphatic alcohol has from 1 to 36 carbon atoms and said aromatic alcohol has from 5 to 20 carbon atoms.

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21. A stable liquid prepolymer of biuret modified toluene diisocyanate having an NCO group content of about 6 to about 44% by weight, comprising

(A) the stable liquid biuret modified toluene diisocyanate of  
30 Claim 1,  
and

5 (B) an isocyanate-reactive component selected from the group consisting of (1) one or more diols having a molecular weight of 76 to 200, (2) one or more polyether polyols having a molecular weight of from 300 to 6000 and containing from about 1.5 to about 6 hydroxyl groups and (3) mixtures thereof.

10 22. The stable liquid prepolymer of Claim 21, wherein the NCO group content ranges from about 16 to about 36% by weight.

15 23. The stable liquid prepolymer of Claim 21, wherein (B)(1) diols are selected from the group consisting of 1,3-butanediol, 1,2-propylene glycol, dipropylene glycol, tripropylene glycol and mixtures thereof, and (B)(2) said polyether polyols have molecular weights of from about 400 to about 4,800 and functionalities of from about 1.8 to about 3.

20 24. A process for the preparation of a stable liquid prepolymer of biuret modified toluene diisocyanate having an NCO group content of about 6 to 44% by weight, comprising:

25 20 (1) reacting:  
(A) the stable liquid biuret modified toluene diisocyanate of Claim 1,  
with  
(B) an isocyanate-reactive component selected from the group consisting of (1) one or more diols having a molecular weight of 76 to 200, (2) one or more polyether polyols having a molecular weight of from 300 to 6000 and containing from about 1.5 to about 6 hydroxyl groups and (3) mixtures thereof;  
30 wherein the temperature is from about 40 to 80°C for about 1 to 4 hours.

25. The process of Claim 24, wherein the temperature is from about 60 to 65°C for about 2 hours.

26. The process of Claim 24, wherein the stable liquid 5 prepolymer of biuret modified toluene diisocyanate has an NCO group content of about 16 to 36% by weight.

27. The process of Claim 24, wherein (B)(1) said diols are selected from the group consisting of 1,3-butanediol, 1,2-propylene glycol, 10 dipropylene glycol, tripropylene glycol and mixtures thereof, and (B)(2) said polyether polyols have molecular weights of from about 400 to about 4,800 and functionalities of from about 1.8 to about 3.

28. A stable liquid prepolymer of biuret allophanate modified 15 toluene diisocyanate having an NCO group content of 6 to 44% and comprising:

(C) the stable liquid biuret allophanate modified toluene diisocyanate of Claim 11;  
and  
20 (B) an isocyanate-reactive component selected from the group consisting of (1) one or more diols having a molecular weight of 76 to 200, (2) one or more polyether polyols having a molecular weight of from 300 to 6000 and containing from about 1.5 to about 6 hydroxyl groups and (3) mixtures thereof.  
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29. The stable liquid prepolymer of biuret allophanate modified toluene diisocyanate of Claim 28, wherein the NCO group content is from about 16 to about 36% by weight.

30. The stable liquid prepolymer of biuret allophanate modified toluene diisocyanate of Claim 28, wherein (B)(1) diols are selected from the group consisting of 1,3-butanediol, 1,2-propylene glycol, dipropylene glycol, tripropylene glycol and mixtures thereof, and (B)(2) said polyether 5 polyols have molecular weights of from about 400 to about 4,800 and functionalities of from about 1.8 to about 3.

31. A process for the preparation of a stable liquid prepolymer of biuret allophanate modified toluene diisocyanate having an NCO group 10 content of 6 to 44% by weight, comprising:

(1) reacting:  
(C) the stable liquid biuret allophanate modified toluene diisocyanate of Claim 11,  
with  
(B) an isocyanate-reactive component selected from the group 15 consisting of (1) one or more diols having a molecular weight of 76 to 200, (2) one or more polyether polyols having a molecular weight of from 300 to 6000 and containing from about 1.5 to about 6 hydroxyl groups and (3) mixtures thereof;

20 wherein the temperature is from about 40 to 80°C for about 1 to 4 hours.

32. The process of Claim 31, wherein the temperature ranges from about 60 to about 65°C for about 2 hours.

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33. The process of Claim 31, wherein the stable liquid prepolymer of biuret allophanate modified toluene diisocyanate has an NCO group content of about 16 to about 36% by weight.

34. The process of Claim 31, wherein (B)(1) said diols are selected from the group consisting of 1,3-butanediol, 1,2-propylene glycol, dipropylene glycol, tripropylene glycol and mixtures thereof, and (B)(2) said polyether polyols have molecular weights of from about 400 to about 5 4,800 and functionalities of from about 1.8 to about 3.